Remarks/Arguments:

With this amendment, the applicant amends claims 9, 21, 29, 30 and 34 and cancels claims 19 and 33. Claims 9-18, 21-32, 34 and 35 are pending. In view of the amendments and the remarks below, the applicant submits that the pending claims are not anticipated nor rendered obvious in light of the prior art cited in the present Office Action. The applicant respectfully submits the pending claims are now in a condition for allowance and requests early notification to that effect.

I. The Office Action

The applicant appreciates the Office withdrawing the finality of the previous Office Action and accepting the applicant's request for continued examination under 37 C.F.R. § 1.114 as well as considering the applicant's preliminary amendment.

A. Claim Objections

The Office Action rejects claims 17 and 31 under 35 U.S.C. § 112, first paragraph and claims 29 and 30 under 35 U.S.C. § 112, second paragraph. In view of the amendments and points noted herein, the applicant respectfully requests reconsideration.

1. Support for Claims 17 and 31

The Office Action rejects claims 17 and 31 under 35 U.S.C. § 112, first paragraph, as containing subject matter that is not described in the specification in such a way as to convey to one skilled in the relevant art that the inventor, at the time the application was filed, had possession of the claimed invention. Particularly, the Office Action rejects the language of "a substrate coated with the lean NOx catalyst is at least 150% that of the oxidation catalyst" as being unclear where this limitation is disclosed in the specification.

As noted in the Office Action, the disclosure at page 2, line 30 to page 3, line 2, recites "[a] first catalyst system provides a low space velocity," and "[a] lower space velocity may be achieved readily in practice by increasing the volume of the catalyst." The applicant also points out that support for the "at least 150%" feature of claims 17 and 31 is provided by a

comparison of the catalyst lengths described in Example 1, taken in conjunction with the above cited passage.

Specifically, Example 1 provides experimental results wherein the catalyst volume of the lean NOx catalyst (9 inches, see note 5) of the present invention is compared with OEM and advanced proprietary JM oxidation catalysts (6 inches, see notes 1 and 2). The loading of the Pt catalyst is the same for these experimental samples; they are all $40g/ft^3$. While the loading value remains constant, the length of the catalyst support increases. As a result, when one compares the amount of catalyst loading per unit length, there is a greater volume of the lean NOx catalyst relative to the oxidation catalyst. In a mathematical sense, Example 1 shows that the amount of lean NOx is at least 150% of that of the oxidation catalyst. Further, when Example 1 is considered in view of the teaching at page 2, line 30 to page 3, line 2, the skilled person would have recognized that the invention contemplated the "at least" feature in conjunction with the "150%" value.

2. Definiteness of claims 29 and 30

Claims 29 and 30 have been amended to incorporate the suggested changes from the Examiner.

B. Lack of Anticipation

The Office Action rejects claims 9, 12-14, 16, 21, 24-26, 28, 34 and 35 under 35 U.S.C. § 102(b) as anticipated by Haensel (U.S. Patent No. 3,503,715). Anticipation requires that each and every limitation of the claim be disclosed, either expressly or under principles of inherency, in a single prior art reference.

With this amendment, the applicant incorporates the limitations of claim 19 into independent claims 9 and 34 and the limitations of claim 33 into independent claim 21. The applicant submits that the novel features recited in claims 19 and 33, namely, "means for injecting hydrocarbon fuel into the exhaust upstream of the lean NOx catalyst" and "introducing additional hydrocarbon fuel into the exhaust gas before the exhaust gas contacts the lean NOx catalyst," respectfully, are neither disclosed nor rendered obvious by Haensel. The applicant

further submits that because claims 10-18, 22-32 and 35 depend from a patentable claim, they are also patentable.

C. Non-obviousness

The Office Action rejected claims 19 and 33 under 35 U.S.C. § 103(a) as being unpatentable over Haensel in view of Abe *et al.* (EP 0 661 089). Specifically, the Office Action argues that Haensel teaches that in conventional engines "secondary or combustion air is injected ahead of the converter inlet usually be means of an aspirator or by a suitable external compressor...to insure reasonable high conversion levels under all conditions of driving" (col. 1 line 70 to col. 2, line 5). The Office Action also states that Haensel is silent as to the means to be used for injecting hydrocarbons, but that it is well known in the art, as evidenced by Abe *et al.,* that additional injection of hydrocarbon fuel insures complete reduction of NOx that is inherently present in the subsequently disclosed "new auto engines," which tend to release "relatively low quantities of unburned hydrocarbons and carbon monoxide as compared with engines in older vehicles" (col. 2, line 5-27 of Abe *et al.*).

1. The cited references

Haensel discloses that the object of the invention disclosed is to provide an oxidation catalyst mixture or arrangement of different catalysts adapted for placement within a converter-muffler means and to accommodate both high and low emission engine operations (col. 2 lines 29-33). The treatment of exhaust gas in Haensel is through an oxidizing catalyst reaction (emphasis added; see *e.g.* col. 2, lines 32-33, 34-35, 43-44, 55-59 and col. 3, lines 35-36). Haensel uses the oxidation catalyst to oxidize hydrocarbon and CO (col. 6, lines 51-60). Haensel, however, is silent as to oxidation (let along reduction) of other exhaust gas reaction products.

Abe *et al.* is directed to an exhaust gas cleaner constituted by a first catalyst comprising a first porous inorganic oxide supporting an Ag component alone or in combination with a Pt component or a W component and a second catalyst comprising a second porous inorganic oxide supporting a Pt component and optionally a W component. As stated in the Office Action,

Abe *et al.* teaches the introduction of a reducing agent on an upstream side of the exhaust gas cleaner (page 3, lines 12-21).

2. The nonobvious differences

First, Haensel teaches away from addition of hydrocarbons upstream of a converter. Second, one of ordinary skill in the art would not have been motivated to combine Abe *et al.*, which teaches the addition of hydrocarbons, with Haensel, which teaches the removal of hydrocarbons. Finally, in forming the combination, the Examiner is using impermissible hindsight gleaned from the applicant's own invention.

The applicant notes that Haensel does not contemplate the addition of hydrocarbon fuel injected ahead of the inlet converter. Haensel discusses how in conventional engines, a secondary air flow may be injected ahead of the converter and that the "rate of secondary air flow is usually adjusted or maintained to provide 10% to about 30% of excess air so as to insure reasonable high conversion levels under all conditions of driving." (emphasis added; col. 2, lines 1-5 full text). Moreover, Haensel describes removal of hydrocarbons and CO with an oxidation catalyst. At col. 2, lines 29-30, Haensel describes "an object of the present invention [is] to provide an oxidizing catalyst bed arraignment such that a specially prepared catalyst suitable [is] for oxidizing ...." By contrast, the claims of the present invention recite "reducing NO_2 to N_2." This means that the lean NOx catalysis of the present invention is the reduction of NOx using a reductant over a suitable catalyst. Third, the Office Action states, "Catalyst A inherently functions as a lean NOx catalyst" because the range of Pt loading of Catalyst A disclosed in Haensel overlaps with that of present claim 9. The applicant submits that one skilled in the art would not discern this from the teaching of Haensel, which teaches only the use of Catalyst A to oxidize CO and hydrocarbons.

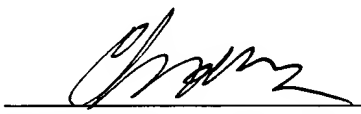
One of ordinary skill in the art would not have been motivated to combine the references because Haensel is directed to removing hydrocarbons while Abe et al. is directed to adding hydrocarbons. Such a combination would be repugnant to the teaching in Haensel.

In sum, Haensel discloses the removal of hydrocarbons from the exhaust gas via an oxidation catalyst, whereas the amended claims recite the addition of hydrocarbons. Therefore, one skilled in the art would not be motivated to combine Haensel with Abe *et al*.

II. Conclusion

The applicant has amended independent claims 9, 21 and 34 to incorporate the limitation of introducing hydrocarbons upstream of the lean NOx catalyst. The applicant also submits that for the reasons set forth above, the independent claims are not rendered obvious by the combination of Haensel and Abe *et al*. Accordingly, the applicant submits that the pending claims are now in a condition for allowance and request early notification to that effect.

Respectfully submitted,



Christopher R. Lewis, Reg. No. 36,201
Christian M. Bauer, Reg. No. 51,443
Attorneys for Applicant

CMB/lrb

Dated: December 16, 2003

P.O. Box 980
Valley Forge, PA 19482-0980
(610) 407-0700

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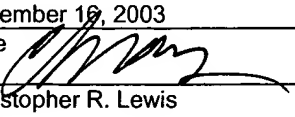

Christopher R. Lewis

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